

High-Risk Young Mothers: Infant Mortality and Morbidity in Four Areas in the United States, 1973–1978

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Abstract: An examination of the changes in infant mortality and morbidity in four regions in the United States has revealed high levels of health problems among the infants of two groups of mothers: those ≤ 17 years and 18–19 year-old multiparas, many of whom began their childbearing under age 18. Despite decreases over the period of observation, neonatal mortality rates remain over one and a half times as high for infants of these mothers as for other mothers, largely due to the relatively high proportion of low birthweight (LBW) infants born to these mothers. Post-neonatal mortality rates also remain high, and may be increasing; this change

cannot be explained solely by differences in proportion of LBW infants between these and older mothers. Both the high post-neonatal mortality rates and the type of morbidity experienced by surviving infants is consistent with the socioeconomic disadvantage of young mothers. The data further indicate the limited resources available to these mothers to cope with their children's health needs, and their potential vulnerability to decreases in public programs supporting child health care. (*Am J Public Health* 1984; 74:18–23.)

Introduction

An increased risk of adverse pregnancy outcomes, as indicated by low birthweight and infant mortality rates, has been demonstrated repeatedly among women under 20 years of age.^{1–5} Longer term health and developmental disadvantages of the children of such young mothers have also been reported.^{6–9} The increase in the numbers of pregnancies to school-aged mothers in the early 1970s has led to increased attention to the prevention and management of pregnancy in this group.^{10,11} Little is known, however, about the changes in pregnancy outcome in recent years, an issue addressed by this paper which compares the mortality and morbidity among infants born to women under age 20 with those of older women.

Methods

As part of a program supported by the Robert Wood Johnson Foundation designed to accelerate the regionalization of perinatal services for high-risk pregnancies,^{12,13} data on infant mortality and morbidity were collected for four geographically defined areas: the state of Arizona; Cleveland and surrounding Cuyahoga County, Ohio; Dallas County, Texas; and 15 counties around Syracuse, New York. In total, these areas account for almost 100,000 births annually and were the four program regions in which morbidity surveys were completed for 1976 and 1978 births.*

Information on low birthweight and mortality rates was derived from reproduced computer tapes of births and matched infant death-birth records obtained from state and local vital statistics departments. Rates were calculated for two-year intervals from 1973 to 1978 for four groups of

mothers: those 17 years old or younger; 18–19 year-old multiparas, most of whom would have experienced their first pregnancy prior to age 18; 18–19 year-old primiparas; and mothers age 20 or older. Fetal deaths were not examined due to the lack of availability of such information from one of the regions.

Changes in health problems, medical care use, and developmental status of surviving infants were assessed through surveys involving births to residents of the region in a six-month period in 1976, and in the same six-month period in 1978. The sampling procedure and survey methods were the same for both periods, and have been described in greater detail elsewhere;^{4,14,15} they will be summarized briefly in this report.

The samples were selected at random from the birth certificate files, stratified to include about 90 per cent of infants weighing 2500 grams or less and 3 per cent of infants weighing more than 2500 grams at birth, all regions combined. All infants were seen in their homes at one year of age, corrected for duration of gestation, by trained lay interviewers using an instrument which included questions on the sociodemographic characteristics of the family, and the health problems and medical care use of the infant during the intervening year, as well as a brief battery of developmental observations.**

Home visits were completed for 67 per cent of the infants eligible for the survey (those eligible were defined as those who had not died or been adopted in the intervening year) in both rounds of survey activity, all regions combined. Of those known to be still in the region at the time of the survey, 84 per cent of the 1976 cohort and 80 per cent of the 1978 cohort were completed. The completions from both surveys were similar in distribution for several variables on the birth certificate as revealed by a detailed analysis of response rates by region and by other evidence that a high degree of comparability of survey methods in the two time periods was achieved.¹⁵ A total of 3,053 interviews were obtained for the 1976 cohort; 3,267 for the 1978 cohort.

Results

As seen in Table 1, births to mothers age 19 and under accounted for a little under 20 per cent of all births in these

*For the remaining four program regions, three subareas of Los Angeles County (California) and the Upper West Side of Manhattan (New York), the second round of survey activity was completed at a later date.

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**Written consent was obtained from the guardian prior to any questions about or observations on the infant.

TABLE 1—Number of Live Births and Neonatal, Post-Neonatal and Infant Mortality Rates by Maternal Age and Race in Four Regions in the US, 1973–74, 1975–76, 1977–78.

Maternal Age	Total			White			Non-White		
	1973/74	1975/76	1977/78 ^a	1973/74	1975/76	1977/78 ^a	1973/74	1975/76	1977/78 ^a
Number of Live Births for Mothers:									
≤17 years old	17,330	16,606	13,989	11,107	10,590	9,341	6,223	6,016	4,648
18–19 years old									
multiparas	7,756	8,068	7,619	5,274	5,476	5,417	2,482	2,592	2,202
primiparas	17,301	16,030	14,276	13,527	12,307	11,173	3,774	3,723	3,103
≥20 years old	174,816	175,847	168,394	148,005	147,569	142,394	26,811	28,278	26,000
Neonatal Mortality Rates ^b for Mothers:									
≤17 years old	17.77	15.72	13.30*	15.94	14.35	12.53*	21.05	18.12	14.85*‡
18–19 years old									
multiparas	17.28	17.23	13.91	17.63	13.70	11.81*	16.52	24.69	19.07
primiparas	9.77	9.48	9.95	9.46	9.26	9.04	10.86	10.21	13.21
≥20 years old	10.80	9.93	8.19*	9.79	9.12	7.37*	16.37	15.83	12.65*
Post-Neonatal Mortality Rates ^c for Mothers:									
≤17 years old	5.70	7.66	6.52	5.49	5.56	5.53	6.07	7.62	8.52
18–19 years old									
multiparas	8.79	9.46	10.25	7.53	8.33	8.97	11.47	11.87	13.43
primiparas	3.91	4.91	3.61	3.66	4.43	3.34	4.82	6.51	4.57
≥20 years old	3.45	3.64	3.09	2.95	3.12	2.53*	6.26	6.35	6.15
Infant Mortality Rates ^d for Mothers:									
≤17 years old	23.37	21.92	19.73*	21.34	19.83	17.99	27.00	25.60	23.24
18–19 years old									
multiparas	25.92	26.52	24.02	25.03	21.91	20.68	27.80	36.27	32.24
primiparas	13.64	14.35	13.52	13.08	13.65	12.35	15.63	16.65	17.72
≥20 years old	14.21	13.53	11.25*	12.71	12.21	9.89*	22.53	20.40	18.73*

‡Difference in mortality rates among different groups of mothers, $p > 0.05$ for χ^2 (3 df).

*Test for linear trend in proportions for change in mortality rates for specific age group, $p < 0.05$.

a) Data for 1977, Cuyahoga County, not available.

b) Neonatal Mortality Rate = Number of infant deaths <28 days per 1,000 live births.

c) Post-Neonatal Mortality Rate = Number of infant deaths 28 days–11 months per 1,000 survivors of the neonatal period.

d) Infant Mortality Rates = Number of infant deaths <1 year per 1,000 live births.

regions during this period. Births to women age 17 and younger accounted for about 40 per cent of such births, and those to 18–19 year old multiparas for another 20 per cent. Among non-White births, the percentage born to mothers age 19 and under was twice as high as that for White births (30 per cent vs 15 per cent).

Infants born to mothers age 17 and under and 18–19 year old multiparas experienced substantially higher mortality than infants born to other mothers both in the neonatal and post-neonatal periods; this disadvantage persisted throughout the period of observation. These differences were more evident among White births, in part as a reflection of the relatively high mortality rates experienced by non-White mothers ≥20. In comparisons of differences in mortality among the four groups of mothers, only differences in neonatal mortality in 1977/78 for non-White births failed to achieve statistical significance.

Declines in neonatal mortality were observed for the two groups of young mothers at high risk of infant mortality, and these trends achieved significance among births to mothers age 17 and under and for births to White 18–19 year old multiparas. That these declines in neonatal mortality were not reflected in sharper decreases in infant mortality was due to an offsetting increase in post neo-natal mortality for births of these two groups of mothers. When the experience of births to mothers age 17 and under and to 18–19 year old multiparas was combined, the post-neonatal mortality rates rose from 6.65 in 1973/74 to 7.83 in 1977/78 ($p = 0.063$ for trend).

The percentage of low birthweight (LBW) infants weighing 2500 grams or less was examined in Table 2. The two high-mortality groups had higher proportions of LBW infants. Direct adjustment for these differences reduced the differentials in neonatal mortality rates, and by 1977/78, the adjusted neonatal mortality experience of all mothers was similar. Adjustment for different proportions of LBW infants did not diminish the differentials in post-neonatal mortality as sharply, however, nor did it alter the trend of increasing post-neonatal mortality for the high-risk groups.

Data from the survey provided other evidence of the disadvantage of infants born to young mothers at high-risk for infant mortality (those age 17 and under and 18–19 year old multiparas). Infants of these mothers experienced higher rates of illness requiring hospitalization and injuries for which medical attention was sought (Table 3). Infants of the 18–19 year old primiparas were also at increased risk of morbidity in a pattern similar to that of other young mothers. Little change in morbidity occurred between the 1976 and 1978 cohorts; those which did occur were to the disadvantage of infants of mothers age 19 or younger, seen as an increase in the proportion with prolonged illness among infants of all young mothers, even those at low risk for infant loss.

Both the higher post-neonatal mortality rates and the types of illness experienced by the infants of young mothers were consistent with patterns associated with socioeconomic disadvantage. This was explored using other data from the survey (Table 3). Over half of the group at high risk for infant

TABLE 2—Percentage of Infants Born Weighing 2500 Grams or Less, and Birthweight-Adjusted* Mortality Rates by Maternal Age and Race in Four Regions in the US, 1973–74, 1975–76, 1977–78*

Maternal Age	Total			White			Non-White		
	1973/74	1975/76	1977/78	1973/74	1975/76	1977/78	1973/74	1975/76	1977/78
Percentage of Births									
≤2500 Grams for Mothers:									
≤17 years old	10.64	10.91	10.78	9.02	8.74	9.14	13.53	14.73	14.07
18–19 years old									
multiparas	11.67	11.87	11.18	10.28	9.46	9.41	14.63	16.98	15.53
primiparas	7.75	8.20	7.77	6.73	7.28	6.88	11.37	11.25	10.96
≥20 years old	6.85	6.82	6.34	6.13	6.12	5.69	10.81	10.47	9.91
Neonatal Mortality Rates‡									
(Adj.) for Mothers:									
≤17 years old	13.56	11.42	10.43	13.59	12.17	10.40	13.65	11.01	9.32
18–19 years old									
multiparas	11.54	11.88	10.12	12.91	11.38	9.86	9.57	12.73	11.02
primiparas	9.36	8.75	9.57	10.01	9.38	9.47	7.97	7.82	9.75
≥20 years old	11.24	10.52	9.13	11.00	10.49	8.98	12.39	11.03	9.90
Post-Neonatal Mortality Rates‡									
(Adj.) for Mothers:									
≤17 years old	5.51	6.05	6.32	5.23	5.55	5.42	5.36	7.03	7.59
18–19 years old									
multiparas	8.32	9.06	9.53	7.32	8.21	8.72	10.49	11.47	11.72
primiparas	3.96	4.93	3.65	3.81	4.48	3.45	4.66	6.14	4.44
≥20 years old	3.63	3.80	3.47	3.19	3.36	2.79	5.82	6.06	5.96
Infant Mortality Rates‡									
(Adj.) for Mothers:									
≤17 years old	18.82	17.31	15.72	18.90	17.54	15.61	18.79	17.89	16.74
18–19 years old									
multiparas	19.59	20.73	19.32	19.94	19.37	18.25	19.85	14.84	22.43
primiparas	13.21	13.59	13.21	13.69	13.78	12.84	12.54	13.86	14.11
≥20 years old	14.73	14.19	12.32	14.06	13.73	11.68	18.01	16.94	15.72

*Each two-year period adjusted directly to the birthweight distribution of the populations of all regions for all years combined, ≤2500, 2501+.

‡Definition of mortality rates as in Table 1.

loss remained in the low-income bracket, and less than one-third had private insurance to pay for medical care. Close to 50 per cent were dependent on public sources of payment (Medicaid plus "other"), and the remainder were self-pay. Young mothers at low risk of infant loss appeared only slightly less disadvantaged with regard to income and mechanisms for payment of care.

Finally, both the increased risk of morbidity and the relative socioeconomic disadvantage for young mothers persisted within racial groups (Table 4). The infants of White and non-White young mothers at high risk for infant loss experienced similar levels of morbidity. The infants of non-White young mothers, however, appeared to be at greater disadvantage in terms of income and reliance on public sources of payment for medical care.

Discussion

The results support the continued concern about child-rearing by young women, particularly those who begin to have their children under 18 years of age. Further, they provide recent population-based data confirming the findings derived from smaller groups served by specific institutions or programs.

Despite dramatic decreases in overall neonatal mortality,¹⁶ neonatal mortality rates remain relatively high for the infants of mothers age 17 or younger and of 18–19 year-old multiparas. These findings parallel the results of earlier population-based studies,^{1,2} albeit at lower levels of mortality. The similarity in risk of adverse neonatal outcome between the infants of mothers age 17 or younger, and those

of 18–19 year-old multiparas, many of whom began their child-rearing under age 18, support the findings of Jekel, *et al.*,⁸ who reported a high risk of prematurity and perinatal mortality among the infants of school-age mothers experiencing second and third pregnancies in their program.

The higher neonatal mortality rates among infants of these high-risk young mothers reflect the higher proportion of LBW infants. Despite almost no change in this proportion, neonatal mortality rates have declined for the high-risk groups. This decline and the similarity in birthweight-adjusted mortality rates for all groups of mothers in 1977/78 is consistent with studies of the efficacy of more intensive obstetrical and neonatal management of high-risk young mothers.^{17–20}

With the increased neonatal salvage of high-risk, LBW infants, the higher, and perhaps increasing, post-neonatal mortality rates initially do not appear to be unexpected. Increased survival of LBW infants, however, is not the sole reason for the increased risk of post-neonatal death and certain types of illness among the infants of high-risk young mothers. Support for this argument is found in the failure of birthweight adjustment to eliminate differences in post-neonatal mortality between high-risk young mothers and others. In addition, other authors⁹ have reported higher rates of postneonatal mortality among the infants of adolescent mothers than among infants of older mothers, a difference which could not be attributed to perinatal events. Further, both LBW and normal birthweight (NBW) infants of mothers who were age 17 or younger at the time of the child's birth are at increased risk of rehospitalization²¹ and injury²² in the first year of life than the infants of older mothers.

TABLE 3—Health of Surviving Infants and Sociodemographic Characteristics of Family at One-Year of Age by Maternal Age, Four Geographic Regions in the US, 1976 and 1978

(Sample N)	Young Mothers ^a at High Risk for Infant Loss			Young Mothers ^b at Low Risk for Infant Loss			Mothers ≥ 20 Years Old		
	1976 (444)	1978 (459)	Total (903)	1976 (164)	1978 (180)	Total (344)	1976 (2413)	1978 (2628)	Total (5041)
HEALTH CHARACTERISTICS									
Percentage ^c with Congenital Anomalies/Developmental Delay ^d †									
% Present	15.0	15.8	15.4	13.0	14.5	13.8	20.3	16.7	18.4
Illness Resulting in Hospitalization ^e †									
% Yes	15.2	12.4	13.9	16.2	13.7	15.0	9.1	9.0	9.1
Injury for which Medical Attention was Sought†									
% Yes	14.1	17.9	15.9	14.8	11.9	13.4	9.0	10.1	9.6
Prolonged Illness ^f									
% Yes	5.3	15.3	10.1	5.3	10.8	8.0	9.2	9.4	9.3
SOCIODEMOGRAPHIC CHARACTERISTICS									
Maternal Employment Status†									
Working	17.8	32.3	24.8	37.2	30.5	33.9	27.4	36.8	32.3
School	16.0	11.1	13.6	12.9	2.5	7.8	0.8	1.6	1.2
Other	66.2	56.6	61.6	49.9	67.0	58.4	71.8	61.5	66.5
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Annual Family Income (percentile) ^g †									
Lower Third	60.5	54.3	57.6	49.4	56.7	53.2	21.2	16.2	18.6
Middle/Upper Third	39.5	45.7	42.4	50.6	43.3	46.8	78.7	83.8	81.4
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Source of Payment for Infants' Medical Care ^h †									
Self	23.1	20.0	21.6	24.5	20.2	22.4	14.5	15.8	15.2
Private insurance	25.3	34.6	29.8	39.2	34.8	37.0	69.1	71.2	70.2
Medicaid	29.2	22.6	26.0	24.3	23.5	23.9	5.7	6.0	5.8
Other	22.3	22.9	22.6	12.1	21.5	16.7	10.8	7.0	8.9
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- a) Mothers age ≤ 17 and 18–19 year old multiparas.
b) 18–19 year old primiparas.
c) Percentages reweighted for differential sampling and completion ratios among regions.
d) Condition reported by mother considered to be the result of chromosomal or inborn metabolic disorder, altered organogenesis and selected perinatal events and/or gross motor behavior equivalent to a developmental quotient < 80 .
e) Does not include hospitalization after birth before coming home for the first time.
f) Illness lasting > 30 days or requiring prolonged medical care, not including congenital anomalies or developmental delay.
g) Annual income in percentiles for given year, all ages combined, to adjust for inflation.
h) The proportion of births on Medicaid and "other" (largely publicly funded sources such as Crippled Children's, C + Y Programs, Public Health Clinics programs) may not apply to other populations since these data include births in Arizona which did not have a Medicaid program.
†Distribution of totals by maternal age group different, $p < 0.05$, χ^2 with the appropriate degrees of freedom.
*Distribution within maternal age group differs between 1976 and 1978, $p < 0.05$, χ^2 with appropriate degrees of freedom.

An alternative explanation is that young maternal age serves as a marker for socioeconomic disadvantage, and that the patterns of post-neonatal mortality and morbidity among the infants of young mothers reflect adverse environmental factors. Such an explanation is consistent with the known association between socioeconomic disadvantage and increased post-neonatal mortality rates, especially from infectious conditions.^{4,23} Additional support is derived from studies which report no differences in perinatal¹⁸ and child health outcomes²⁴ between adolescent mothers and older mothers after controlling for socioeconomic factors. Finally, a recent report from the 1970 British Births Survey²⁵ concludes that part of the association of childhood morbidity with young maternal age reflects an association of young maternal age and socioeconomic disadvantage.

This latter report, however, stresses that young maternal age is an independent risk factor for childhood morbidity, especially hospitalizations for accidents and gastroenteritis. The increased risk of morbidity for the children of young mothers is attributed to maternal inexperience in parenting, a conclusion consistent with other reports of the difficulties

affecting adolescent mothers in the assumption of their roles as parents.^{6,7,9,20} One aspect of this role, i.e., obtaining appropriate medical care and advice,²⁶ is highlighted by the results of confidential inquiries into post-neonatal deaths, where the major "avoidable" factor was found to be failure to use medical care at a level appropriate to the needs of the child.²³

Our results focus on other factors which may act to decrease access to medical care for high-risk young mothers. Despite an increase in the percentage of young mothers working, over half the families remain in the low-income group, a finding consistent with the previously noted restricted employment opportunities among those who begin their child-bearing early.^{6,27} It should be added that the increase in the percentage employed has not resulted in a significant shift in mechanisms of payment for care.

Both sets of factors would have their greatest impact on access to ambulatory services. For about half the infants of high-risk young mothers (those classified as self-pay or private insurance), access to ambulatory services might be limited in view of the relatively low income for the families.

TABLE 4—Health of Surviving Infants and Sociodemographic Characteristics of Family at One-Year of Age by Maternal Age and Race, Four Geographic Areas, 1976/78 Combined

(Sample N)	White			Non-White		
	Young Mothers ^a at High Risk of Infant Loss (465)	Young Mothers ^b at Low Risk of Infant Loss (236)	Mothers ≥ 20 yrs (4080)	Young Mothers ^a at High Risk of Infant Loss (438)	Young Mothers ^b at Low Risk of Infant Loss (108)	Mothers ≥ 20 yrs (960)
HEALTH CHARACTERISTICS						
Percentage ^c with Congenital Anomalies/Developmental Delay ^d						
% Present	15.3	15.0	18.9	15.5	10.4	15.0
Illness Resulting in Hospitalization ^e						
% Yes	13.5	13.9	8.9*	14.6	17.8	10.3*
Injury for which Medical Attention was Sought ^f						
% Yes	14.5	16.8	9.5*	18.7	4.5	9.9*
Prolonged Illness ^g						
% Yes	13.3	10.2	10.1	3.9	2.3	3.7
SOCIODEMOGRAPHIC CHARACTERISTICS						
Maternal Employment Status						
Working	27.1	33.6	30.0*	20.5	34.6	47.1*
School	3.6	4.5	1.0	33.0	16.3	2.9
Other	69.4	61.9	69.0	46.6	49.2	50.0
Annual Family Income ^h						
Lower Third	50.0	55.8	15.0*	73.3	77.0	42.4*
Middle/Upper Third	50.0	44.2	85.0	26.7	23.0	57.6
Source of Payment for Infant's Medical Care ^h						
Self	27.0	24.4	15.4*	11.2	17.2	13.5*
Private Insurance	35.6	46.6	73.9	18.6	12.1	45.9
Medicaid	14.7	16.0	3.4	47.9	44.3	21.6
Other	22.8	13.0	7.3	22.3	26.4	19.9

a-h) Definitions as in Table 3.

*Distribution by different maternal age-parity categories within racial group differs at $p < 0.05$ level, χ^2 with appropriate degrees of freedom.

The use of ambulatory care is dependent on income and, even among the insured group, coverage for ambulatory care is unlikely.^{28,29} For the remainder, dependent on publicly supported care for their infants, other restrictions may be encountered, including hours and types of services provided under different programs. Such restrictions in access may result in a reluctance to seek care early or to comply with follow-up care.

In summary, the children of young mothers are at increased risk of adverse neonatal outcome, largely as a reflection of birthweight. They continue to be at increased risk for death and morbidity in the post-neonatal period as a result of maternal inexperience and the socioeconomic disadvantage characteristic of young mothers.

The results of this study underscore both the increased health problems of the infants of young mothers and the limitations of the resources to help them and their families to cope with these problems.

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Another View of Reaganomics

"Policy analysis" done using the microeconomic paradigm seeks to effect what can only be called a revolution in the topics for political debate. For such policy analysis tries to draw conclusions about what public policies are desirable: (1) without taking equity considerations in account in particular policy areas (leaving them to one-time cash transfers); and (2) taking preferences as givens and seeking an optimizing solution based on given preferences. . . .

"—to develop policy recommendations, taking preferences as given—is simply impossible even if it were desirable. By undertaking the kind of analysis they do, microeconomics-influenced policy analysts themselves seek to influence people's preferences in at least five important ways discussed in the course of this book. They seek to influence people's preferences: (1) away from caring about preferences (which is a preference itself); (2) away from caring about equity issues in the design in public policies; (3) towards ascribing greater weight to efficiency goals in public policy designs; (4) towards a sympathy for self-interest as a motivation for human behavior; and (5) by favoring market exchanges, towards increased calculativeness and decreased value imputed to various nonpriced things. The microeconomic agenda is pregnant with implications for people's preferences.

"In a way, this sort of policy analysis may be seen as scholarship for the "Me generation." A time of cynicism about not only public officials but public life as well, such as has existed in the United States during the past decade, is a fertile time for ideas that lack, in my view, an adequate appreciation or understanding of the role of public life. These doctrines not only reflect the cynicism, but also reinforce it as well. Such doctrines fail to give weight to other ideas that would nudge people in a different direction. These other ideas—such as those attributing importance to altruism or community—jostle for salience in the minds of the very same citizens who also share the cynicism.

"Economists who analyze regulatory policy have now gained, as a result of the 1980 elections, an unprecedented influence over the formation of public policy in areas such as environmental protection and occupational safety and health. The dominance of microeconomics in academic policy analysis now has its counterpart in a dominant role for practitioners of microeconomic analysis in actual policy formation. I suspect that unhappiness with some of the implications of various of the policies these practitioners plan to pursue will, slowly at first but gaining momentum over a period of time, produce a reaction. Just as many of the policies professed by the current administration were nurtured within the scholarly community and gradually became the stuff of practical politics, so too may the reaction to them first come within the world of ideas. Once developed there, it may move outward into the broader political debate."

—In: Kellman S: *What Price Incentives? Economists and The Environment*. Boston: Auburn House Publishing Co., 1981